WAJSENBERG, A.O.

Category : POLAND/Nuclear Physics - Structure and Properties of Nuclei C-4

Abs Jour : Ref Zhur - Fizika, No 2, 1957 No 3176

Author : Wajsenberg, A.O.
Title : Investigation of Internal Structure of the Nucleus with the aid of Mesons and Electrons

Orig Pub : Chem. szkole, 1955, 1, No 5, 4-14

Abstract : See Ref. Zh. Fiz., 1955, 18528

Card : 1/1

VAYSENBERG, A.C.

ALIKHANIAN, A.I., ; VAYSENBERG, A.C., kandidat fiziko-matematicheskikh nauk

Elementary particles. Tekh. mol. 23 no.5:10-14 My '55. (MIRA 8:6)

1. Chlen-korrespondent Akademii nauk SSSR (for Alikhanian).
(Particles, Elementary) (Nuclear forces)

USSR/Nuclear Physics

Card 1/1 Pub. 86 - 3/35

Authors : Vaysenberg, A. O.

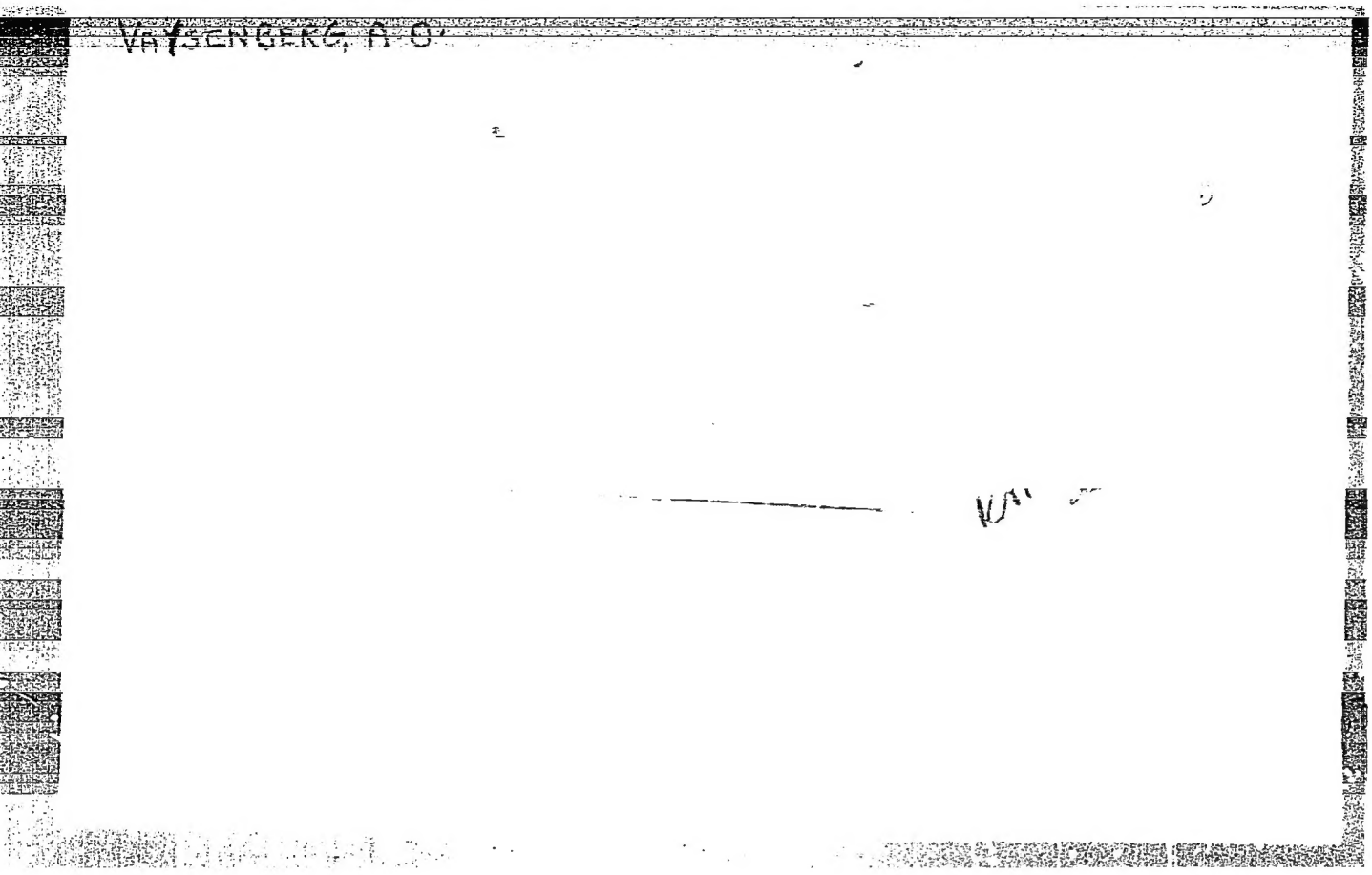
Title : Research of the internal structure of the nucleus with the aid of mesons and electrons

Periodical : Priroda 44/2, 24 - 30 Feb 1955

Abstract : A study is made of the structure and characteristics of the nucleus. It is found to possess periodic properties, since the energy binding protons and neutrons together changes, in periodic fashion, with the increase of these particles. Two experiments are described in which measurements are made of the spectra of X-ray radiation of meso-atoms from Al, Si, Cu, Zn, Sb, Mg and Pb; and, another in which the dispersion of rapid electrons is studied. Four references ; 2 USSR and 2 USA (1953 - 1954). Diagrams; graphs; table.

Institution : .....

Submitted : .....



VAYSENBERG, A. O.

5758
HEAVY UNSTABLE PARTICLES. (HYPERONS AND K MESONS). A. O. Vaisenberg. Uspekhi Fiz. Nauk, 57, 631-89(1955) Dec. (In Russian). (cf. NSA 10-2101.)

A general review of up to date data on charged K mesons, charged V-particles, K meson and hyperon formations, and their interactions with nuclei are presented. (R.V.J.)

VAYSENBERG, A.O. (Moskva)

Recent data on elementary particles. Fiz. v shkole 16 no.6: 7-17 N-D '56. (MLRA 9:12)

(Particles, Elementary)

120-2-31/37

AUTHOR: Vaysenberg, A. O., Smirnitskiy, V. A., Rabin, N. V.

TITLE: A Microscope Stage for Particle Scattering Measurements in Nuclear Photoemulsions. (Mikroskopnyy Stol dlya Izmereniya Rasseyaniya Chastits v Yadernykh Fotoemul'siyakh.)

PERIODICAL: Pribory i Tekhnika Eksperimenta, 1957, No. 2, pp. 112 - 114 (USSR).

ABSTRACT: The development of the photoemulsion cameras has lead to an increase in the track lengths which can be observed, an increase in the statistical accuracy of scattering measurements, and the independence of experimental results from the degree of development of the emulsion. Among the factors which determine the accuracy of scattering measurements, the most important are those due to the noise which exists because of the finite grain size and intervals between them, to the noise introduced by distortion, and to the noise due to the microscope stage, the longitudinal displacement of which is accompanied by small transverse displacements equivalent to scattering. It was required to have a microscope bench with longitudinal movement of a few cm and with not more than 0.01 micron of the transverse displacement. The present type of the "sprung action" microscope bench is due to Cosyns (Ref. 1) and this

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A Microscope Stage for Particle Scattering Measurements in Nuclear Photoemulsions.

principle is also used in the KOPHЦKA M-52 bench. The bench has the following drawbacks: springs have to be accurately calibrated, it is temperature and load sensitive and its noise increases at large displacements. Since a glass surface can be prepared to a very great accuracy, the authors have constructed, and now describe, a microscope bench using two accurately prepared glass plates as guides. The action of the bench can be clearly seen from Figure 1, where 1 is a heavy steel plate with two steel blocks covered by the above glass plates acting as buffers and guides. The "noise" of the bench has been measured by means of the Michelson interferometer with results given in Figure 3, where the abscissa represents the magnitude of the displacement and the ordinate the mean value of the second order differences (curve A), which represents a "noise" of 0,005 micron for the displacement of 50 to 100 microns. In the same figure curve B represents the noise of the KOPHЦKA-M 52 of Gottstein (Ref. 3). Two photographs of the bench assembly and two graphs of experimental results are given. There are three references, none of which is Slavic.

120-2-31/37

A Microscope Stage for Particle Scattering Measurements in Nuclear Photoemulsions.

SUBMITTED: November, 14, 1956.

AVAILABLE: Library of Congress.

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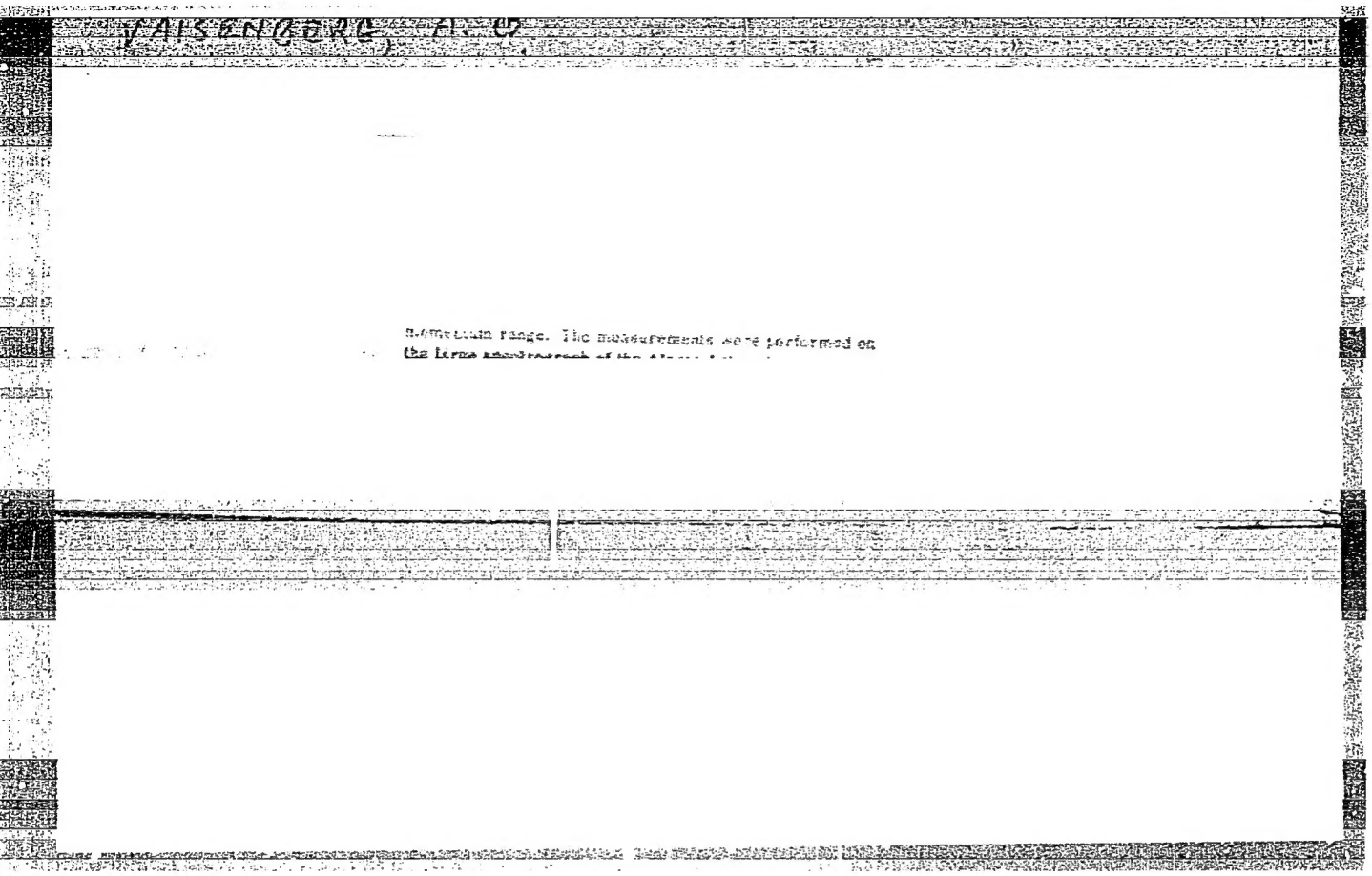

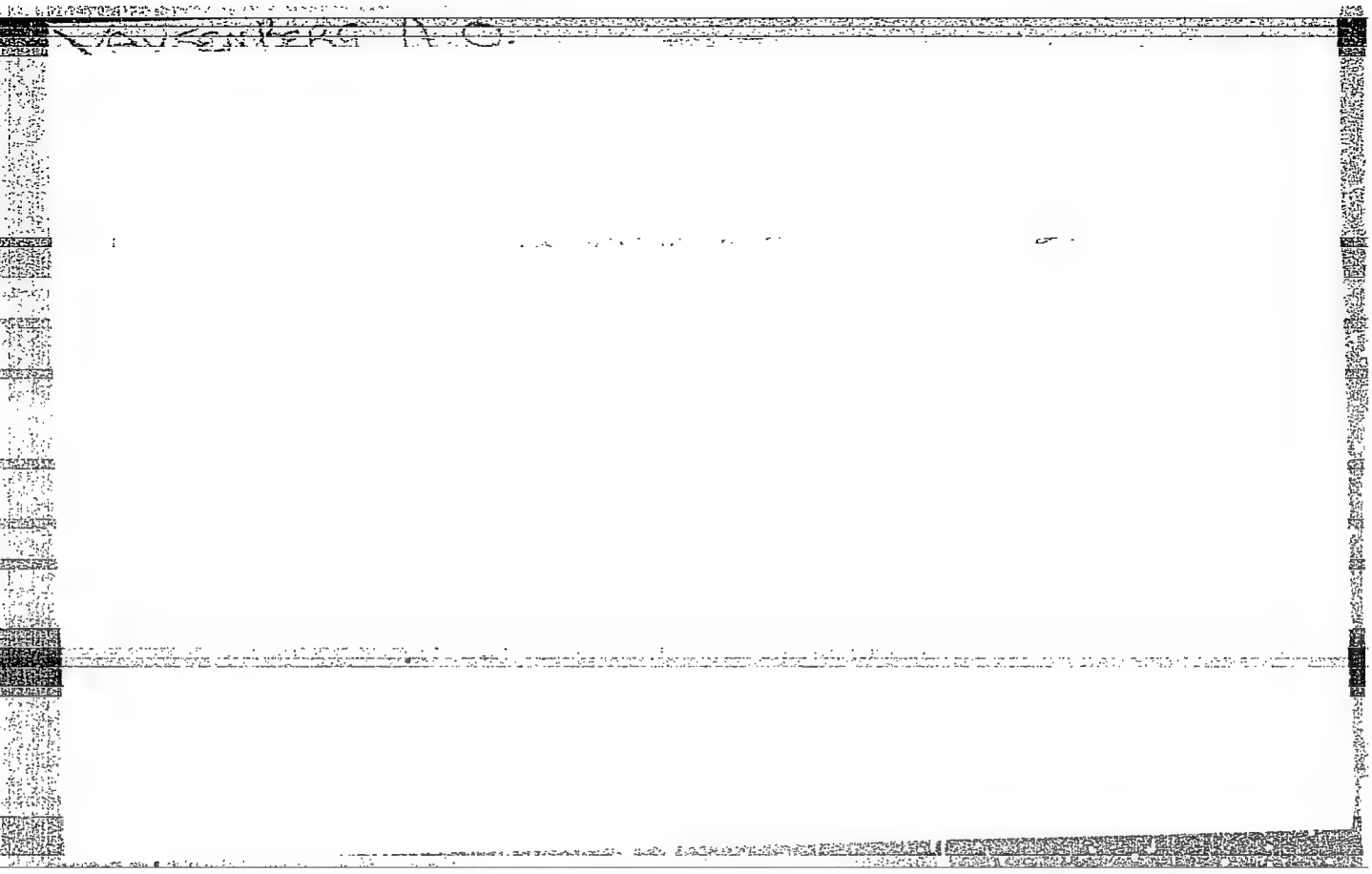

VAYSENBERG, A. O.

AUTHOR ALIKHANYAN, A.I., VAYSENBERG, A.O., PA -2950

TITLE The Spectrum and the Positive Surplus of the Hard Component within Momentum Domain(o,3-17).10^9eV/c at an Altitude of 3250 m. (Spektr i polozhitel'nyy izbytok zhestkoy komponenty v oblasti impul'sov(o,3-17).10^9eV/c na vysote 3250 m - Russian)

PERIODICAL Zhurnal Eksperim. i Teoret. Fiziki, 1957, Vol 32, Nr 3, pp 413-416, (U.S.S.R.)

Received 6/1957 Reviewed 7/1957

ABSTRACT The present work continues the measurement begun previously (VAYSENBERG, A.O., Zhurn. Eksp. i Teor. Fiz., 1957, Vol 32, Nr 3, p 417) of the momentum spectrum and the positive surplus by measuring the domain of much higher momenta of up to $1,7.10^{10}$ eV. Measurements were carried out in 1952 with the large magnetic spectrometer of the ALAGEZ laboratory at a magnetic field strenght of 1370e Ørsted. In the case of such a field strenght the probable measuring error committed when measuring the momentum $1,7.10^{10}$eV/c amounts to about 50%. The construction of the magnetic spectrometer and the utilization of the results were already described several times. Above the measuring system a 7 cm thick lead layer was mounted and the entire thickness of all lead absorbers above the counter series amounted to 5,8 cm. Below the loth series of counters a 14 cm thick lead layer, and below this series an 11th series of counters was located. The particles passed through the mentioned lo series of counters without increasing were ascribed to the hard component. The rang of these particles was larger than 5,8 cm lead. The range of the particles passing also through the 11th coun-

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The Spectrum and the Positive Surplus of the Hard Compo- PA - 2950
nents within the momentum Domain (0,3-17).10^9eV/c at an Altitude of 3250m.

ter series was larger than 19,8 cm lead. Measuring results obtained by measuring of the momenta of 8966 particles, i.e. the amounts n_+ and n_- of the positive and negative charged particles respectively, the momenta of which are in the intervals mentioned, are given in a table. These results furnish the momentum-spectrum and the distribution of the positive surplus over the spectrum. The last column of the table contains the values of the positive surplus for the total interval of the momenta of from 0,3 to 17.10^9eV/c. This surplus averaged over the entire interval has the value k=5082/3666 = 1,39 ± 0,08, for particles with a range of R 5,8. For particles with a range of more than 19,8 cm lead, the positive surplus amounts to k = 2929/2271 = 1,29 ± 0,03. The integral spectrum of myons computed on the basis of the ranges of more than 19,8 cm lead for momenta of above 5.10^9 eV/c is described satisfactorily by the experimental function $p^{-\gamma}$ with the exponent $\gamma = 2,45 \pm 0,05$.
(2 ill, and 1 table).

ASSOCIATION Physical Institute of the Academy of Science of the Armenian SSR.
PRESENTED BY
SUBMITTED 6.10.1956.
AVAILABLE Library of Congress.
Card 2/2

PA - 2951

AUTHOR VAYSENBERG A.O.

TITLE The Spectra of the Momenta of Cosmic Radiation and the Positive Surplus within the Interval (0,1 - 2,5) 10^9 eV/c in an Altitude of 3250 m.
(Spektry impul'sov kosmicheskogo izlucheniya i polozhitel'nyy izbytok v intervale (0,1 - 2,5).10^9 eV/c na vysote 3250 m.- Russian)

PERIODICAL Zhurnal Eksperim. i Teoret. Fiziki 1957, Vol 32, Nr 3, pp 417 - 422 (USSR).
Received: 6/1957 Reviewed: 7/1957

ABSTRACT The present paper discusses the measurements of the spectra mentioned above carried out in 1949 - 1952 by means of the small magnetic spectrograph of the ALAGEZ laboratory for Cosmic Radiation. This device was described in detail already in previous papers. The author here investigates the spectra of unfiltered radiation consisting of electrons, mesons, and protons and the spectra of hard components from which the electrons were eliminated. The paper is divided into the following chapters:
1. The spectra of the unfiltered radiation, the absorption of the positive surplus, 3. The spectrum of the hard components, 4. The intensity of the proton components.

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PA - 2951

The Spectra of the Momenta of Cosmic Radiation and the Positive Surplus within the Interval (0,1 - 2,5) 10^9 eV/c in an Altitude of 3250 m.

Summary of results: From the type of the spectra of unfiltered radiation it follows that in an altitude of 3250 m, besides electron- and meson components, also proton components exist in noticable quantities. This manifests itself in a positive surplus of the total radiation of 1,50 ± 0,02.
In the case of momenta of more than $8,10^8$ eV/c the positive surplus depends only little upon the momentum, and its amount is near 1,5.
Within the domain of small momenta of the spectrum of non-filtered radiation the positive surplus is nearly eqqual to 1. Within the average momentum domain of from 2 to $8,10^8$ eV/c the positive surplus rapidly increases, attains its maximum value, which is near to 2, at $k \sim 5,10^8$ eV/c, and is again reduced to 1,5. The high positive surplus within this domain is explained by the existence of a considerable number of protons. The influence exercised by the protons on the amount of the positive surplus manifests itself in the spectrum of the hard components. Within this spectral domain a purely mesonic positive surplus of 1,25 ± 0,06 could be determined.

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PA - 2951

The Spectra of the Momenta of Cosmic Radiation and the Positive Surplus within the Interval (0,1 - 2,5) 10^9 eV/c in an Altitude fo 3250 m.

If the positive surplus of the meson components is known, the number of protons within the investigated momentum interval of (3,4 - 25).10^8 eV/c can be estimated. This number amounts to from 13 to 17% of the total intensity of the hard components.
(4 Illustrations and 2 Tables.)

ASSOCIATION: not given.
PRESENTED BY: -
SUBMITTED: 6. 10. 1956.
AVAILABLE: Library of Congress.

CARD 3/3

56-4-15/52

AUTHOR VAYSENBERG, A.O., SMIRNITSKIY, V.A.

TITLE The Meson Decay of a Tritium Hyperfragment.
(Mezonnyy raspad tritiyevogo giperoskolka -Russian)

PERIODICAL Zhurnal Eksperim. i Teoret.Fiziki,1957,Vol 32,Nr 4,pp 736-737(USSR)

ABSTRACT During the systematic examination of Ilford G-5 emulsion layers (exposed to radiation in an emulsion chamber for eight hours in an altitude of 25 km in Italy in the fall of 1955) put at their disposal by Prof.Powell,the authors of the paper under review discovered a mesonic decay of a tritium hyperfragment,with a negative pion being retarded in the emulsion.This case is being mentioned in the paper under review for the purpose of supplementing the relevant statistical data.From the primary star of the type $10+0_n$(reproduced in the paper under review) a slow simply charged particle hf is emitted.This particle is stopped in the same layer and it forms a secondary star with three rays.The range of hf amounts to 360$\mu$and on basis of the range) is larger than the mass of the proton.Also the estimate on basis of scattering and range yields a value that is larger than the proton mass.The charge of hf, as determined on basis of the number of interruptions,on basis of the range,and on basis of the thickness of the trace,equals 1.At the secondary star two particles with short ranges have equal ranges,namely $12\pm0.6\mu$. The estimate of the charge yields z=1.Trace 3 belongs to a negative pion with the range of 15,700μ.This negative pion penetrated eight layers of emulsion and produced at the end of its range a

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VAYSENBERG, A.O.

56-6-11/56

AUTHOR: VAYSENBERG, A.O., SMIRNITSKIY, V.A.

TITLE: Investigation of Correlations in $\pi \rightarrow \mu \rightarrow e$ - Decays (Issledovaniye korrelyatsiy pri $\pi \rightarrow \mu \rightarrow e$ raspadakh. Russian)

PERIODICAL: Zhurnal Eksperim. i Teoret. Fiziki, 1957, Vol 32, Nr 6, pp 1340 - 1343 (U.S.S.R.)

ABSTRACT: In the present paper the energies resulting from the $\pi^+ \rightarrow \mu^+ \rightarrow e^+$ - decay in a photoemulsion are measured of the positrons and the angles between the flying-off direction of the positrons and myons. The authors up to now investigated 2334 $\pi - \mu$-acts of decay which were observed on the occasion of the systematical inspection of the part of the emulsion chamber recorded by Prof. POWELL. This emulsion chamber was irradiated at a height of 28 km.
The traces of the positrons and myons enclose with the emulsion plane only small angles. It is therefore possible, without committing grave errors, to refer the correlation to particles, the traces of which are located in the emulsion plane. The spectrum measured here of the positrons produced on the occasion of the decay is shown in a diagram. In this spectrum the particles with an energy of more than 40 MeV are investigated, the emission direction of which includes small angles together with the flying-off direction of the myon. The corresponding data are shown in a table. The front-rear asymmetry in the case of small angles is extraordinarily high, but decreases in the case of a decrease

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Investigation of Correlations in $\pi \rightarrow \mu \rightarrow e$ - Decays 56-6-11/56

of the angular aperture. The amount of this asymmetry agrees well with its theoretical value. When taking account of all angles (0 - 90 ° and 90 - 180 °) the asymmetry effects decrease but are still easily observable. From a diagram shown here the following conclusions are drawn:

1.) Towards the front 54 positrons were emitted, and 66 towards the rear.
2.) The share of the positrons flying off in the rear direction increases considerably at an increase of the energies from 25 to 40 MeV.
3.) From the particles with an energy of more than 55 MeV, 9 flew off in the rear direction and only 2 in the frontal direction.

In conclusion the data obtained here are compared with a theoretical curve. Attention is drawn in short to the differences (apparently connected with the depolarization) between experiment and theory. (With 2 illustrations and 1 table).

ASSOCIATION Academy of Science of the U.S.S.R. (Akademiya Nauk SSSR)

PRESENTED BY

SUBMITTED 19.3.1957

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Card 2/2

VAYSENBERG, A.O.

56-3-12/59

AUTHORS Vaysenberg, A.O., Smirnitskiy, V.A.

TITLE The Energy Dependence of the Angular Correlation of the $\pi^+ - \mu^+ - e^+$-Decay.
(Zavisimost' uglovoy korrelyatsii pri $\pi^+ - \mu^+ - e^+$-raspade ot energii - Russian)

PERIODICAL Zhurnal Eksperim.i Teoret.Fiziki, 1957, Vol 33, Nr 3, pp 621-624 (USSR)

ABSTRACT The energy of the positrons and the angle between the positron direction and the μ-mesotron from 580 disintegrations in the emulsions NIKFI -R and Ilford G-5 were measured. For the corrélation coefficient A the following values were measured:

Energy	$\overline{\cos\vartheta} > \varepsilon = A/2$	Energy	$\overline{\cos\vartheta} > \varepsilon = A/2$
0	$-(0,053 \pm 0,033)$	0,6	$-(0,118 \pm 0,040)$
0,1	$-(0,053 \pm 0,033)$	0,7	$-(0,148 \pm 0,045)$
0,2	$-(0,052 \pm 0,033)$	0,8	$-(0,156 \pm 0,051)$
0,3	$-(0,064 \pm 0,034)$	0,9	$-(0,192 \pm 0,059)$
0,4	$-(0,060 \pm 0,035)$	1,0	$-(0,200 \pm 0,074)$
0,5	$-(0,083 \pm 0,037)$	1,1	$-(0,206 \pm 0,104)$

The value A which increases with increasing positron energy agrees with the forecasting of the two component - neutrino theory.
There are 2 tables, 3 figures and 1 Slavic reference.

SUBMITTED June 10, 1957
AVAILABLE Library of Congress.
Card 1/1

24(5)
AUTHORS: Vaysenberg, A. O., Smirnitskiy, V. A., Kolganova, E. D., Minervina, Z. V., Pesotskaya, Ye. A., Rabin, N. V.

SOV/56-35-3-13/61

TITLE: Angular Correlations for Positrons of Low Energy in π^+-μ^+-e^+ Decay (Uglovaya korrelyatsiya dlya pozitronov maloy energii pri π^+-μ^+-e^+-raspade)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1958, Vol 35, Nr 3, pp 645 - 648 (USSR)

ABSTRACT: After the discovery of the nonconservation of parity with weak interaction, several groups of research scientists investigated the energy dependence of the angular correlation of positrons in π^+-μ^+-e^+ decay (Refs 1-3); according to Mukhin, Ozerov and Pontekorvo (Ref 4) the connection between asymmetry and energy corresponds to the laws of the two-component theory, according to which the formula (1)

$$\cos\vartheta = \frac{\alpha\lambda}{3}\,\frac{2\varepsilon - 1}{3 - 2\varepsilon}$$

applies, where ϑ denotes the angle

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Angular Correlations for Positrons of Low Energy in π^+-μ^+-e^+ Decay

SOV/56-35-3-13/61

between the direction of myon spin and the direction of the emission of the positron in μ^+-e^+ decay. ξ denotes the energy of positrons in units of its maximum energy, λ-a parameter of the theory (which is determined from the ratic between interaction constants), α - a coefficient which shows what part of myons is polarized at the instant of decay. In the present paper the correlation was not investigated in space, but in the plane, so that the formula used here for cos ϑ is distinguished from (1) by the fact that the first factor of the right side is $\alpha\pi/2$. A photoemulsion plate "NIKFI-R" of 400μ thickness was used for the investigations; it was exposed to a π^+-meson beam of the synchrocyclotron of the OIYaI (Obyedinennyy institut yadernykh issledovaniy = United Institute for Nuclear Research)(cf.also reference 2). Results are, essentially, given in two tables.

1) Series of measurements, 1099 positron traces:

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Angular Correlations for Positrons of Low Energy in $\pi^+-\mu^+-e^+$ Decay

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ϑ		ε: 0-0,3	0,3-0,6	0,6-0,9	0,9
0-180°	number of particles n	46	333	440	280
0 - 60°	$\overline{\cos\vartheta} \pm 0{,}7/\sqrt{n}$	+0,18±0,10	0,00±0,04	-0,05±0,03	-0,09±0,04
	n	34	231	300	198
120-180°	$\overline{\cos\vartheta} \pm 0{,}85/\sqrt{n}$	0,30±0,15	0,00±0,06	-0,06±0,05	-0,16±0,06

2. Series of measurements, 8000 $\pi^+-\mu^+-e^+$ decay events, of which 200 with $\varepsilon < 0{,}3$

ϑ	ε: 0-0,3	0,3-0,6
0-180° n	201	499
$\overline{\cos\vartheta}$	0,07±0,05	0,01±0,03
0 - 60° n	141	337
120-180° $\overline{\cos\vartheta}$	0,13±0,07	0,01±0,05

(ϑ is the angle between the direction of emission of the myon and that of the positron). Similar measurements have recently been carried out by Pershin et al (Ref 7) in the propane-bubble-chamber. The authors in conclusion thank A.I.Alikhanov for his interest in this work

Card 3/4

and A.P.Birzgal for calculations. Moreover, they express their gratitude to the collaborators of the testing group for evaluating a large number of plates.

There are 2 tables and 7 references, 5 of which are Soviet.

SUBMITTED: May 31, 1958

21(8)
AUTHORS: Vaysenberg, A. O., Smirnitskiy, V. A. SOV/56-36-1-56/62

TITLE: The Decay of a Beryllium Hyperfragment (Raspad berilliyevogo giperoskolka)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959, Vol 36, Nr 1, pp 333-335 (USSR)

ABSTRACT: By systematical scanning of layers of the emulsion Ilford G=5 irradiated in an altitude of ~25 km, the authors detected a non-meson-decay of a beryllium hyperfragment which permits relatively precise measurement of the binding energy of the Λ^0-particle. A slow hyperfragment is emitted from a primary star of the type 12 + 4p. It is stopped in the same layer and causes a secondary three-ray star. The range of the hyperfragment amounts to 60 μ. An estimation of the charge by comparing the thickness of the hyperfragment track with the thickness of the tracks of the Be^8 hyperfragments and of α-particles (which were produced in the decay of Be^8) gives Z ~4. Analogous estimations were carried out for the other tracks. The authors suggest the decay scheme $\Lambda^* Be^8 \rightarrow He^4 + d + p + n + Q$,

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SOV/56-36-1-56/62

The Decay of a Beryllium Hyperfragment

$Q = (160.0 \pm 1.3)$Mev. For the binding energy of Λ^0 in the nucleus Be^8 the value $B_{\Lambda^0} = (8.2 \pm 1.6)$Mev is found. The values measured of B_{Λ^0} for the hitherto known decays of $\Lambda^0 Be^8$ are equal to 3.7 ± 3; 0 ± 5; 9.3 or 6.6 (depending on the decay scheme); 5.9 ± 0.5 (meson decay). The 3 schemes $\Lambda^0 Be^9 \rightarrow He^5 + d + p + n + Q$; $\Lambda^0 Be^8 \rightarrow He^3 + H^3 + p + n + Q$; $\Lambda^0 Be^9 \rightarrow He^4 + H^3 + p + n + Q$ can be excluded since they give high negative values of B_{Λ^0}. The decay schemes with several neutral particles cannot be excluded from being considered, but they are less probable. There are 1 figure and 7 references, 1 of which is Soviet.

SUBMITTED: October 8, 1958

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SOV/56-36-4-8/70

21(1)
AUTHOR: Vaysenberg, A. O.

TITLE: Positrons of Low Energy in $\mu^+ - e^+$ -Decay (Pozitrony maloy energii pri $\mu^+ - e^+$ -raspade,

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959, Vol 36, Nr 4, pp 1019-1021 (USSR)

ABSTRACT: In the course of an investigation of the anisotropy of the flying-off of positrons in $\pi^+ - \mu^+ - e^+$ -decay (Refs 1,2) it was found that within the range of low positron energies ($\lesssim$20 Mev) the μ-e-correlation is somewhat greater than might be expected according to the two-component neutrino theory (Ref 3). Investigation of positron distribution within the first spectral range is therefore of interest. The author analyzed a number of positron spectra and, with the aid of all data available, he calculated the Michel parameter ρ. In reference 1-1100 positron spectra had been investigated, in reference 4 - 405, in references 5,6,7,8 - 1161, and in reference 9 - 286, so that the author had a total of 2952 positron observations available (see table). For the positron spectrum in the case of four-fermion interaction it holds that

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Positrons of Low Energy in $\mu^+ - e^+$ -Decay

$P(\varepsilon)d\varepsilon \sim 4\varepsilon^2 \left[3(1-\varepsilon) + 2\varrho\left(\frac{4}{3}\varepsilon - 1\right)\right] d\varepsilon$ (ε = positron energy); if ϱ is between 0 and 0.75, the corresponding number of low-energy particles is $\eta_{\varepsilon\varepsilon} = \int P(\varepsilon)d\varepsilon$, ($\varepsilon \leq 0.3 - 0.4$). After integration one obtains $\varrho = 3(4-3\varepsilon)/8(1-\varepsilon) - 3\eta_{\varepsilon\varepsilon}/8(\varepsilon^3 - \varepsilon^4)$; the numerical calculation in consideration of the statistical error gives $\varrho = 0.72 \pm 0.10$; this value agrees with the two-component neutrino theory in that the latter gives the value $\varrho = 0.75$ without relative correction. There are 1 figure, 1 table, and 10 references, 3 of which are Soviet.

SUBMITTED: October 8, 1958

Card 2/2

SOV/56-36-6-8/66

21(7)
AUTHORS: Vaysenberg, A. O., Rabin, N. V., Smirnitskiy, V. A.

TITLE: The Depolarization of $\mu^{\pm}$-Mesons in Nuclear Emulsions (Depolyarizatsiya μ^{+}-mezonov v yadernoy emul'sii)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959, Vol 36, Nr 6, pp 1680 - 1686 (USSR)

ABSTRACT: The present paper intends to determine exact values of the asymmetry coefficients in the spatial distribution of positrons from the reaction $\pi^{+} - \mu^{+} - e^{+}$ in nuclear emulsions; the author carried out a comparative investigation of ordinary and double-diluted NIKFI-R-emulsions as well as Ilford G-5; among other things, they investigated 9101 π^{+}-μ^{+}-e^{+}-decays in NIKFI-R emulsions; irradiation was carried out on the synchrocyclotron of the OIYaI (Joint Institute of Nuclear Research). The following decays were selected for investigation: 1) such having an electron trace length of ≥ 1 mm, 2) with a distance of the vertex of the decay from the emulsion surface of the glass $>100\mu$. Table 1 shows the angular distribution of the measured decays for $0<\vartheta<180^{0}$ (ϑ is the angle between the primary μ-trace and the e^{+}-trace in the emulsion plane). The asymmetry coefficient a may be determined either from the

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average value $\cos\vartheta$ or from the forward-backward difference. It is found, with correction, that a= -0.66 ± 0.018. Gurevich et al.(Ref 4) obtained from an analysis of 8990 decays in NIKFI-R a= -0.092 ± 0.018, Ivanov and Fesenko (Ref 5) obtained the value a= -0.065 ± 0.041; for NIKFI-R an average value of a= - 0.077 ± 0.012 is thus obtained. Table 2 compares the a-values in Ilford G-5 and NIKFI-R obtained from various publications; the mesons originate partly from cosmic radiation, and partly from accelerators. For Ilford G-5 the average values a= -0.139 ± 0.014 (from all data), a= 0.133 ± 0.018 (cosmic radiation) and a= 0.148 ± 0.021 (accelerators) are obtained. In all cases the NIKFI-R-emulsions have a considerably smaller asymmetry coefficient. The ratio between the depolarizability of NIKFI and Ilford is found to amount to (0.139±0.014)/(0.077±0.012)= 1.81±0.33. Further, the results obtained by investigating doubly-diluted Ilford G-5 and NIKFI-R emulsions are published. For the former other authors obtained a= -0.190±0.033 for the latter -0.136±0.037 and -0.118±0.041, which results in an average value of -0.127±0.028. The ratio between the a-values of doubly-diluted NIKFI (with gelatin) and normal NIKFI is found to amount to 1.65 ± 0.40. Further

The Depolarization of μ^+-Mesons in Nuclear Emulsions SOV/56-36-6-8/66

data concern a-measurements in NIKFI-R in strong magnetic fields. The following was obtained: a(2500 G)= -0.186±0.020 and a(17000 G) =-0.28±0.02. The authors finally thank A. I. Alikhanov and I. I. Gurevich for their interest and discussions, further Ye. A. Pesotskaya and Z. V. Minervina for their help in evaluating results, B. A. Nikol'skiy for his assistance in irradiating the emulsions in the magnetic field, and D. M. Samoylovich, in whose laboratory the emulsion layers were developed. There are 3 tables and 21 references, 7 of which are Soviet.

ASSOCIATION: Institut teoreticheskoy i eksperimental'noy fiziki Akademii nauk SSSR (Institute for Theoretical and Experimental Physics of the Academy of Sciences, USSR)

SUBMITTED: January 7, 1959

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21 (7)
AUTHORS: Vaysenberg, A. O., Smirnitskiy, V. A., SOV/56-37-1-63/64
Kolganova, E. D., Rabin, N. V.

TITLE: The Energy Dependence of the Spatial Asymmetry of Positrons in $\pi^+ \to \mu^+ \to e^+$ Decay (Zavisimost' ot energii prostranstvennoy asimmetrii pozitronov pri $\pi^+ \to \mu^+ \to e^+$-raspade)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959, Vol 37, Nr 1, pp 326 - 328 (USSR)

ABSTRACT: The present "Letter to the Editor" is a continuation of a number of other works (Refs 1-3). The asymmetry coefficient a of this reaction was determined according to the equation $dN = (1+a\cos\vartheta)d\Omega$ (ϑ angle between the direction of the departure of muon and electron, $d\Omega$ - solid angle element) as amounting to 0.077 ± 0.012 for NIKFI-R emulsions; a increases to 0.28 ± 0.07 if the emulsion is located in a magnetic field of 17 kG. The data are mean values obtained by measurements of the entire spectrum. Investigations of the energy dependence of a were carried out by means of a NIKFI-R photoemulsion pile in the perpendicular magnetic field of 17 kG; irradiation was carried out on the synchrocyclotron of the OIYaI (Joint Institute of Nuclear

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The Energy Dependence of the Spatial Asymmetry of Positrons in $\pi^+ \rightarrow \mu^+ \rightarrow e^+$ Decay

SOV/56-37-1-63/64

Research). Positron energy was measured by means of the method of multiple scattering, for which purpose the microscopes Kornitska MS-2 and MBI-9 were used. Part of the measurements was carried out by means of a semiautomatic device. 565 traces were selected according to certain criteria, which are enumerated. Under these conditions it holds that $a(\mathcal{E}) = 1.27 \frac{N_f - N_b}{N_f + N_b} \pm \frac{(1.27^2 - a^2(\mathcal{E}))}{\sqrt{N_f + N_b}}$, where N_f denotes the number of forward decays; N_b the number of backward decays. The N_f and N_b are given in a table for 10 energy intervals between 0 and 1.1. A diagram shows the dependence of $a(\mathcal{E})$ on the positron energy $\mathcal{E}$. The drawn-in curve represents $a(\mathcal{E})$ according to the theory of the two-component neutrino: $a(\mathcal{E}) = 3.0.28(1-2\mathcal{E})/(2\mathcal{E}-3)$; (here 0.28 ± 0.02 is the value of the asymmetry coefficient at 17 kG). The dotted curves show the energy dependence of a obtained from the statistical errors of energy measurement and from the bremsstrahlung in experimental conditions (upper curve: 10% dispersion

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and 4 mm track length, lower curve: 20% dispersion and 1 mm track length). The differential spectrum of $a(\varepsilon)$ obtained expresses the rapid growth with energy and agrees with the two-component neutrino theory. In an earlier paper (Ref 2) the authors also worked with NIKFI-R photoemulsions ($a = -0.077 \pm 0.012$), and within the energy range of 0 - 0.3 they obtained the average value of $a = +0.14 \pm 0.10$. (In the case of the measurements published, the measured a-values are all within the positive range, and the theoretical curves intersect the ε-axis at about 0.4 - 0.5). The authors finally thank Z. V. Minervin and Ye. A. Pesotskaya, and D. M. Samoylovich and B. A. Nikol'skiy for taking part in the experiments. There are 1 figure, 1 table, and 3 Soviet references.

SUBMITTED: May 7, 1959

·21 (1)

AUTHOR: Vaysenberg, A. O.

SOV/56-37-2-43/56

TITLE: The Spatial Asymmetry for Low-energy Positrons in the $\pi^+ - \mu^+ - e^+$ Decay

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959, Vol 37, Nr 2(8), pp 566-567 (USSR)

ABSTRACT: This investigation has been made with the aim of studying the totality of the data on the asymmetry of the spatial distribution of positrons in the $\pi^+ - \mu^+ - e^+$ decay, found in the author's laboratory and elsewhere in literature. Special attention was paid to the asymmetry coefficient $a_{0-\varepsilon}$ averaged over the spectrum from $\varepsilon = 0$ to the energy ε. The following measurements were carried out in the author's laboratory: 1) Measurements of the total spectrum of 1102 particles with $a = 0.077$. 2) Measurements of the spectrum of the slow electrons, 345 particles having been separated for $a = 0.077$ with an energy $\varepsilon < 0.6$. 3) Measurements of the total spectrum of 565 positrons for $a = 0.28$. The measurements 1) and 2) were carried out with a normal NIKFI-R—emulsion, the measurements 3) with

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The Spatial Asymmetry for Low-energy Positrons in the $\pi^+ - \mu^+ - e^+$ Decay

the same emulsion, but in a field of 17000 gauss. It is convenient to express the experimental data through the difference of the positrons emitted forward and backward: $\delta = (N_{forward} - N_{backward}) / (N_{forward} + N_{backward})$. In a table the values of $N_{forward}$ and $N_{backward}$ for the energy interval 0 to 0.3, 0.3 - 0.6; 0.6 - 0.8; 0.8 - 1.0 and > 1.0 and the values of δ in these intervals are given. According to this information the asymmetry decreases sharply in the transition from the edge of the spectrum to small energies and vanishes almost completely at $\mathcal{E} < 0.5$. The statistical accuracy of the results in the range of small energies is markedly increased, if not only these data, but all other data known on the asymmetry at small energies (determined by means of photoemulsions) are taken into account. They are compiled in a second table. δ equals zero in the interval 0 to 0.6. The values of δ observed are not at variance with the values derived from the two-component theory. The asymmetry at low energies has also been measured by means of a magnetic

The Spatial Asymmetry for Low-energy Positrons in the $\pi^+ - \mu^+ - e^+$ Decay

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spectrometer (Ref 9). The results due to this method are in agreement with those given in this paper. There are 1 figure, 2 tables, and 9 references, 4 of which are Soviet.

SUBMITTED: May 7, 1959

Card 3/3

VAYSENBERG, Aleksandr Ovseyevich; KOZLOV, V.D., red.; VIRKO, I.G., red.

[Mu-mesons] Miu - mezon. Moskva, Izd-vo "Nauka," 1964. (MIRA 17:7)
399 p.

MUKHIN, Konstantin Nikiforovich; VAYSENBERG, A.O., prof., retsenzent; KALYUZHNAYA, T.P., red.

[Introduction to nuclear physics] Vvedenie v iadernuiu fiziku. Izd.2., perer. i dop. Moskva, Atomizdat, 1965. 720 p. (MIRA 18:9)

VAYSENBERG, A.O.; KOLGANOVA, E.D.; RABIN, N.V.

Disintegration of photoemulsion nuclei by slow π^--mesons. IAE. fiz. 1 no.4:652-658 Ap '65. (MIRA 18:5)

1. Institut teoreticheskoy i eksperimental'noy fiziki Gosudarstvennogo komiteta po ispol'zovaniyu atomnoy energii SSSR.

TITLE: Muon polarization and the ratio of form factors in $K^+_{\mu 3}$ decay

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 48, no. 6, 1965, 1604-1610

TOPIC TAGS: muon, K meson, meson polarization

ABSTRACT: This work is a continuation of a preliminary [illegible] In order to check on the correct value of the form factor ratio by comparing the theoretical and experimental values of the probability ratio for $K_{\mu 3}$ and K_{e3} decays, the authors measured the angular distribution of positrons for 887 positive muons from $K^+_{\mu 3}$ decay, as well as the μ^+-meson longitudinal polarization. The meas-

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urements were made with a pellicle stack having a volume of about 1 liter of type R emulsion. The chamber was irradiated in the proton synchrotron of Institut teoreticheskoy i eksperimental'noy fiziki (Institute of Theoretical and Experimental Physics) in an unseparated

[illegible] primary proton [illegible] longitudinal muon polarization was +0.68 ± 0.28, indicating the form factor ratio is 0 ± 1. "The authors thank A. I. Alikhanov for interest

figures. [illegible]

ASSOCIATION: None

SUBMITTED: 26Jan65 ENCL: 00 SUB CODE: NP

NR REF SOV: 004 OTHER: 007

Card 2/2

VAYSENBERG, A.O.; KOLGANOVA, E.D.; RABIN, N.V.

Measuring the masses of charged particles with a short residual range in nuclear photographic emulsions. Prib. i tekh. eksp. 9 no.4:71-75 Jl-Ag '64. (MIRA 17:12)

L 13496-65 EWT(m)/T/EWA(m)-2 s/0056/64/047/004/1262/1269

ACCESSION NR:

AUTHORS: Vaysenberg, A. O.; Kolganova, E. D.; Rabin, N. V.

TITLE: Mass spectrum of charged particles emitted upon absorption of negative pions by emulsion nuclei

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 47, no. 4, 1964, 1262-1269

TOPIC TAGS: particle spectrum, negative pi meson, pion scattering, nuclear emulsion

ABSTRACT: This is a continuation of earlier work (Phys. Let. v. 2, 112, 1962) and is aimed at obtaining more accurate data on the yields of [illegible] charged particles and their spectra. The work was done with nuclear [illegible] synchrocyclotron. Charged particle mass spectra [illegible]

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ACCESSION NR: AP4047893

and heavy (Ag, Br) emulsion nuclei. The emulsions were also exposed

nuclei [illegible]

15% respectively. The yield of deuterons with energies [illegible] MeV from heavy nuclei is close to 40% and is small for energies less than 20 MeV. Absorption of fast negative pions does not result in appreciable emission of complex particles. A comparison of the results with calculations based on the direct-reaction theory shows that the experimental data are best described by the pole mechanism of absorption of a negative pion by a nucleon, if it is assumed that the virtual particle is the He^4 nucleus. "The authors are grateful to I. S. Shapiro for continuous interest and a discussion." Orig. art. has: 6 figures, 5 formulas, and 2 tables.

ASSOCIATION: None

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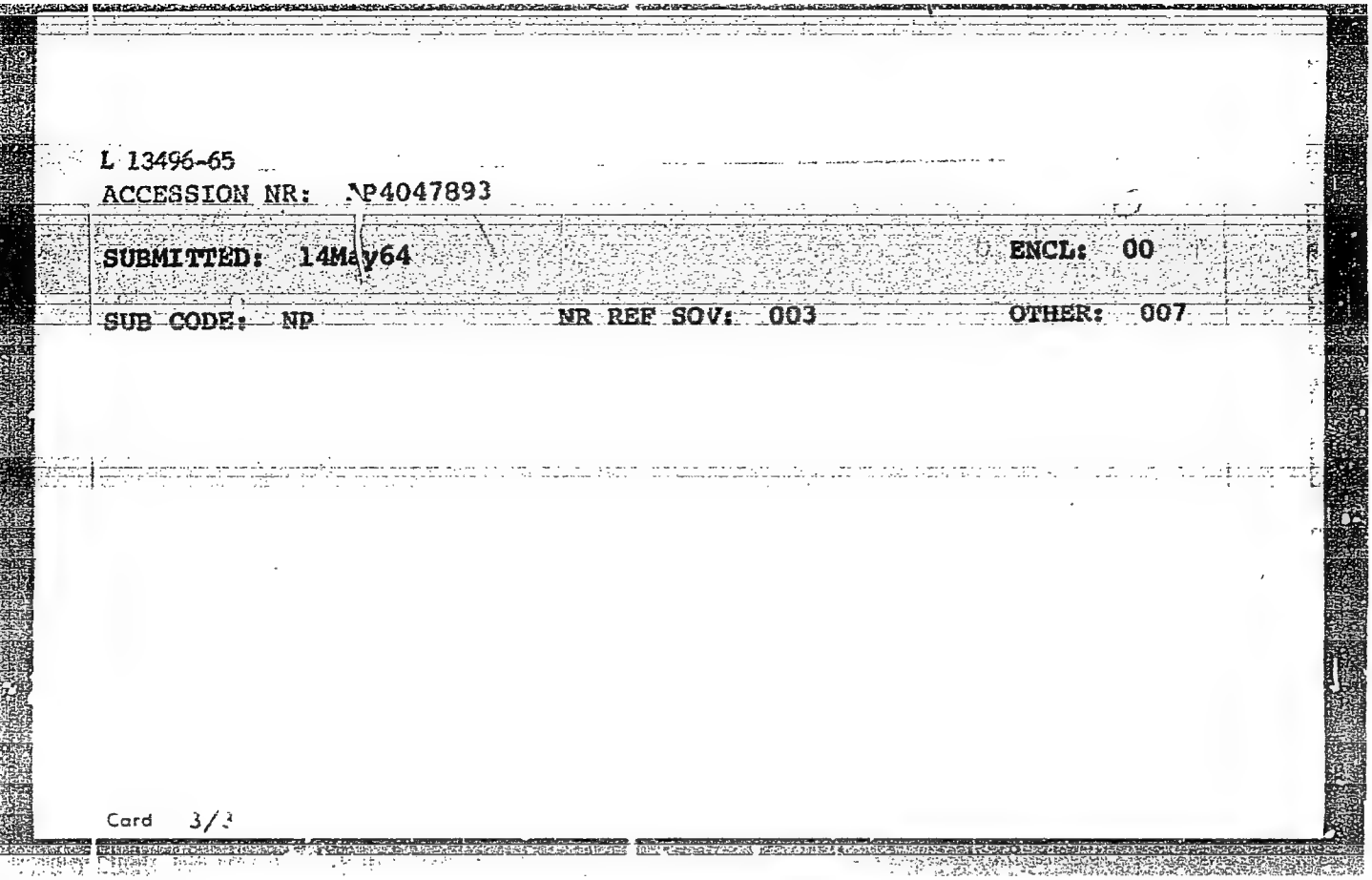

L 13496-65
ACCESSION NR: AP4047893

SUBMITTED: 14May64 ENCL: 00

SUB CODE: NP NR REF SOV: 003 OTHER: 007

Card 3/3

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001859130001-3"

VAYSENBERG, A.O.

Use of mesons and electrons in studying the internal nuclear structure. Dos. such. fiz. no.5:105-115 '57. (MIRA 16:6)

(Nuclei, Atomic)

ALIKHANYAN, A.I.; VAYSENBERG, A.O.

Recent experimental data on μ-mesons. Izv. AN SSSR. Ser. fiz. 26 no.6:698-710 Je '62. (MIRA 15:6)
(Mesons)

VAYSENBERG, A.O.; PESOTSKAYA, Ye.A.; SMIRNITSKIY, V.A.

Electron spectra emitted in the decay of negative μ-mesons in a nuclear emulsion. Zhur.eksp.i teor.fiz. 41 no.4:1031-1036 O '61. (MIRA 14:10)

(Mesons—Decay) (Photography, Particle track)

S/048/62/026/006/001/020
B125/B112

AUTHORS: Alikhanyan, A. I., and Vaysenberg, A. O.

TITLE: New experimental data on μ-mesons

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Seriya fizicheskaya, v. 26, no. 6, 1962, 698 - 710

TEXT: This is a survey of the experimental data published from 1946 to 1961 relating to electromagnetic interactions of muons (production of meson pairs by photons, scattering of high-energy muons from nuclei, measurement of the magnetic moment of a meson) and to the weak interactions of the muons (total probability of the muon-electron decay, asymmetry spectrum in the $\mu \to e + \nu + \bar{\nu}$ decay, muon polarization at the time of $\pi - \mu$-decay, "spirality" of the particles produced in the decay $\mu \to e + \nu + \bar{\nu}$). There are 8 figures. The most important English-language reference is: R. Feynman, N. Gell-Mann, Phys. Rev., 109, 193 (1958).

Card 1/1

VAYSENBERG, A.O.; KOLGANOVA, E.D.; RABIN, N.V.; PESOTSKAYA, Ye.A.

Ionization measurement in photoemulsions of type P. Prib. i tekh. eksp. 6 no.2:57-59 Mr-Ap '61. (MIRA 14:9)
(Ionization) (Photographic emulsions)

VAYSENBERG, A.O.; SMIRNITSKIY, V.A.

Semiautomatic unit for measuring multiple scattering. Prib.i tekh.eksp. 6 no.5:44-47 S-O '61. (MIRA 14:10)
(Particles (Nuclear physics)--Scattering--Measurement)

VAYSENBERG, A.O.; KOLGANOVA, E.D.; MINERVINA, Z.V.

Angular distribution of μ -mesons in π - μ -decay. Zhur.eksp.i teor.fiz. 41 no.1:106-108 Jl '61. (MIRA 14:7)

1. Institut teoreticheskoy i eksperimental'noy fiziki AN SSSR.
(Mesons) (Photography, Particle track)

VAYSENBERG, A.Ya.

Capture of μ^--mesons in carbon accompanied by B^{12*} formation. (MIRA 14:7)
Zhur.eksp.i teor.fiz. 41 no.1:109-112 Jl '61.

1. Institut teoreticheskoy i eksperimental'noy fiziki AN SSSR.
(Mesons--Capture) (Boron--Isotopes)
(Photography, Particle track)

VAYSENBERG, A.O.

Determining the energy of hyperfine splitting in the 1 s state of muonium. Zhur.eksp.i teor.fiz. 41 no.3:853-855 S '61. (MIRA 14:10)

1. Institut teoreticheskoy i eksperimental'noy fiziki AN SSSR.
(Mesons)

VAYSENBERG, A.O.; SMIRNITSKIY, V.A.; KOLGANOVA, E.D.

Study of the electron spectrum and asymmetry resulting from π-μ- e-decay in a nuclear photoemulsion. Zhur. eksp. i teor. fiz. 40 no.4:1042-1049 Ap '61. (MIRA 14:7)
(Mesons--Decay) (Electrons)

VAYSENBERG, A.O.; KOLGANOVA, E.D.; SMIRNITSKIY, V.A.

Studying asymmetry in the decay of negative μ-mesons in a nuclear emulsion. Zhur.eksp.i teor.fiz 39 no.5:1198-1200 N '60. (MIRA 14:4)

(Mesons—Decay) (Photography, Particle track)

VAYSENBERG, A.O.; SMIRNITSKIY, V.A.

Asymmetry of $\pi^+ - \mu^+ - e^+$ decay in a magnetic field. Zhur. eksp. i teor. fiz. 39 no.2:242-248 Ag '60. (MIRA 13:9)
(Mesons—Decay) (Magnetic fields)

S/053/60/070/03/002/007
B006/B014

AUTHOR: Vaysenberg, A. O.

TITLE: New Experimental Data on the Decays of π- and μ-Mesons

PERIODICAL: Uspekhi fizicheskikh nauk, 1960, Vol 70, Nr 3, pp 429-487 (USSR)

ABSTRACT: The present paper gives a survey of experimental results of investigations concerning the properties of free pions and muons. It is based on publications of the last two years, viz. primarily articles of Western periodicals. The author first describes the problem and discusses the fundamental publications by Lee and Yang, Feinman and Gell-Mann, dealing with the decay of muons and pions. The second section is devoted to the mass and lifetime of π- and μ-mesons. The latest data on mass (Refs 15-18) are compiled in a table. The individual lifetimes are mentioned. The value obtained for the μ^+-meson slightly differs depending on whether it was determined by experiments on cosmic rays or by means of accelerators (2.22 or 2.21 ± 0.02 μsec); $\tau_{\pi^\pm} = (2.56 \pm 0.05).10^{-8}$ sec and $\tau_{\pi^0} = (5.0\ ^{+5}_{-2}).10^{-15}$ sec. In the third section the author

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New Experimental Data on the Decays of π- and μ-Mesons

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discusses the electron spectrum obtained from the π-μ-e decay as well as the asymmetry of spatial electron distribution (theoretical electron spectrum and electron angular distribution; electron spectrum of the μ-e decay and determination of the Michel (Mishel') parameter ρ by the photoemulsion method, by means of a chamber located in a magnetic field, and a magnetic spectrometer; asymmetry of the spatial distribution of electrons from the $\pi \rightarrow \mu \rightarrow e$ decay; experiments on electrons by means of counters and magnetic spectrometers, experiments by the photoemulsion method; asymmetry of the spatial distribution of positrons within the range of small energies). The fourth section deals with the chirality of leptons and with the law of conservation of the lepton charge, and the fifth section with the magnetic moment of the muon. The sixth section is devoted to the electronic pion decay and to the search for radiative pion- and muon decays ($\pi \rightarrow e + \nu$ decay; radiative beta decay of the pion; search for $\mu \rightarrow e + \gamma$ decays). The seventh section gives results of experimental investigations of muon depolarization (measurement of the asymmetry coefficient)

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New Experimental Data on the Decays of π- and μ-Mesons

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of various substances; the spin relaxation time of μ^+-mesons; the asymmetry coefficient in photoemulsions; the asymmetry coefficient in a dilute emulsion (NIKFI-R); kinematic depolarization of μ^+-mesons; depolarization of μ^+-mesons in matter; attempts to detect the muon triplet state; polarization conservation by means of a magnetic field; the true values of the asymmetry coefficient; depolarization of μ^--mesons). The following Soviet authors are mentioned: Landau, Okun', G. B. Zhdanov, A. A. Khaydarov, V. P. Kuznetsov, A. I. Mukhin, Ye. B. Ozerov, B. Pontekorvo, Smirnitskiy, Babayan, V. G. Vaks, B. L. Ioffe, Meshkovskiy, Gurevich, Ivanov, P. L. Kapitsa, Zel'dovich, and Gershteyn. There are 38 figures, 10 tables, and 144 references, 32 of which are Soviet.

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86890

S/056/60/039/005/004/051
B029/B077

24.6900

AUTHORS: Vaysenberg, A. O., Kolganova, E. D., Smirnitskiy, V. A.

TITLE: Study of the Asymmetry in the Decay of Negative Muons in a Nuclear Emulsion

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1960, Vol. 39, No. 5(11), pp. 1198 - 1200

TEXT: P. M. Shmushkevich (Ref.2) and V. A. Dzhrbashyan (Ref.3) showed that negative muons lose most of their polarization in mesic atoms during cascade transitions. This agrees with experimental values of A. E. Ignatenko et al. (Ref.4). The authors determined the coefficient of asymmetry of the $\mu^- \rightarrow e^-$ decay in a nuclear emulsion without a magnetic field ($H < 0.1$ oe) and in a strong magnetic field ($H = 11$ koe) parallel to the negative muon beam. Emulsion films of the type НИКФИ-Р (NIKFI-R) were bombarded with a negative muon beam in the synchrocyclotron of OIYaI (Joint Institute of Nuclear Research). The initial polarization of the negative muons probably does not differ considerably from the polarization of the positive muons, which according to

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A. I. Mukhin, Ye. B. Ozerov, and B. Pontekorvo (Ref.5), is 0.81 ± 0.11. The distribution of decay electrons with respect to the direction of the negative muon beam is described by a relation of the form $1 + a\cos\vartheta$. The authors observed a total of 9279 decays without applying a magnetic field, and 3403 decays in a magnetic field of 11 koe. Conditions and results of measurements are given in the following table:

Magnetic field strength H		$< 10^{-1}$ oe	11 koe
Number of decays	backward	4580	1707
	forward	4699	1696
Coefficient of asymmetry		$+0.02 \pm 0.017$	0.00 ± 0.025
Number of observers		6	14
Consistency		$\chi^2 \sim 8$	$\chi^2 \sim 25$

Within the limits of the statistical error there is no noticeable asymmetry, and the magnetic field has no influence on the asymmetry, either. The negative muons are slowed down by the light (C,N,O) and heavy components (Ag,Br) of the emulsion with about the same frequency.

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Study of the Asymmetry in the Decay of Negative Muons in a Nuclear Emulsion

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There is fairly good agreement between the results of several observers, especially for H = 0. Further measurements did not establish a noticeable asymmetry either. For H = 11 koe, $a = 2 \cos\vartheta \pm 1.57/\sqrt{N}$ increases slightly at the end of the spectrum. There is practically no asymmetry in the decay of negative muons in a nuclear emulsion of the type NIKFI-R, independently of the external magnetic field. Thus, it is impossible to use the method of photoemulsions when observing such secondary effects which are related to the polarization of negative muons, such as the asymmetric emission of protons in stars which appear during the absorption of negative muons by a nucleus, and also the asymmetric departure of electrons from β active recoil nuclei which are created by such an absorption. The authors thank N. V. Rabin and Ye. A. Pesotskaya for assisting in the measurements. There are 1 figure, 1 table, and 7 references: 5 Soviet, 1 US, and 1 Dutch.

SUBMITTED: May 28, 1960

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